

# Gender and the Politics of Death: Female Representation, Political and Developmental Context, and Population Health in a Cross-National Panel

Ross Macmillan<sup>1,2</sup> · Naila Shofia<sup>3</sup> · Wendy Sigle<sup>4</sup>

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**Abstract** There is considerable speculation that female political empowerment could improve population health. Yet, evidence to date is limited, and explanations for why political empowerment would matter and the conditions under which this might be enhanced or muted are not well understood. In this article, we draw on theoretical work on the politics of representation to frame an investigation of whether increases in the percentage of females in a country's parliament influence mortality rates. We further examine whether the relationship is conditioned by extent of democracy and economic and social development. Through multivariate longitudinal regression, we analyze four indicators of mortality in 155 countries spanning 1990 to 2014 with controls for initial country conditions, time-stable structural predispositions to higher mortality, and a number of time-varying potential confounders. Results indicate that a high level of female representation—30 % or greater in our models—has large negative associations with mortality, that these are particularly strong in lesser developed and weak democratic contexts, that high female political representation effectively offsets liabilities associated with low development, and that the relationships are robust to various operationalizations of social development. In the end, our research provides a particularly thorough accounting of the relationship between female political

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✉ Ross Macmillan  
[i.ross.macmillan@gmail.com](mailto:i.ross.macmillan@gmail.com); [ross.macmillan@unibocconi.it](mailto:ross.macmillan@unibocconi.it)

<sup>1</sup> Department of Social and Political Science and Dondena Centre for Research on Social Dynamics and Public Policy, Bocconi University, Milan, Italy

<sup>2</sup> Department of Sociology, University of Limerick, Limerick, Ireland

<sup>3</sup> Public Policy and Administration, Bocconi University, Milan, Italy

<sup>4</sup> Department of Gender Studies, London School of Economics and Political Science, London, UK

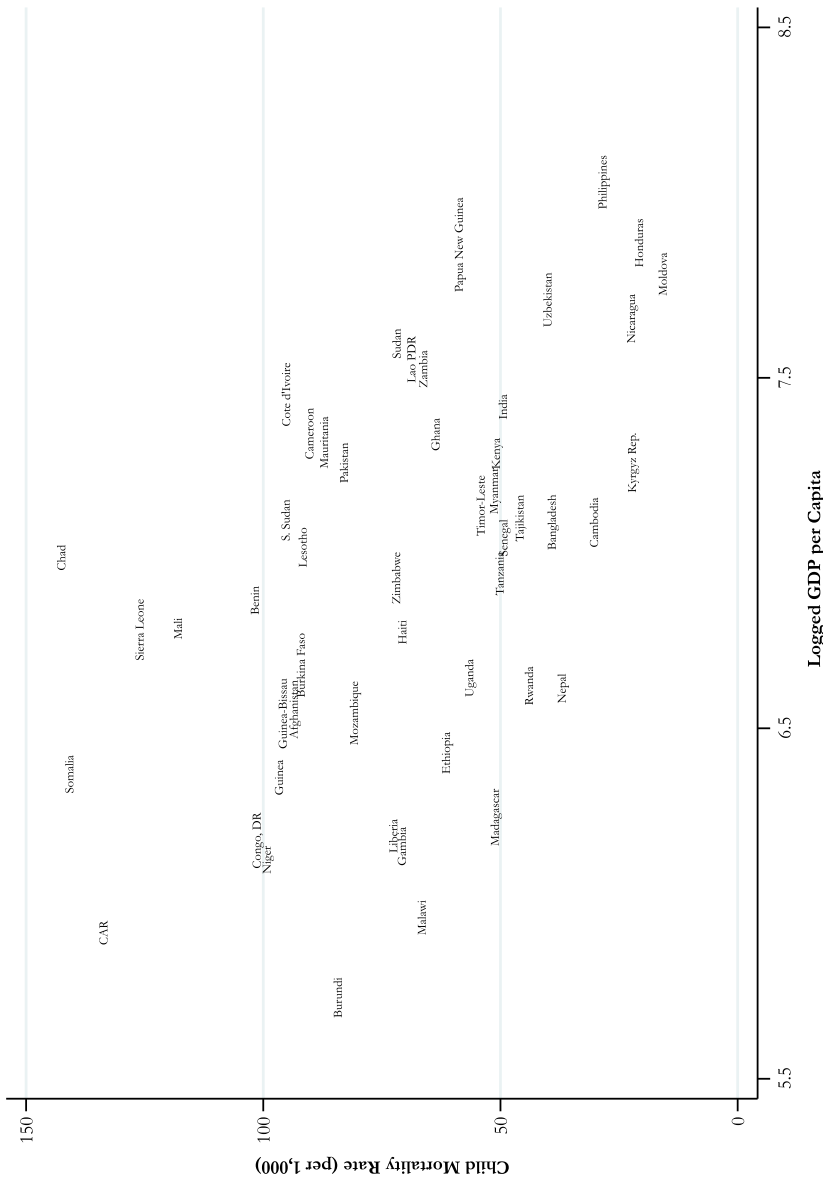
representation and population health, particularly by specifying the conditions under which female representation is most salient. In doing so, the research suggests important links between issues of female empowerment, political context, and developmental trajectories of countries more generally.

**Keywords** Health · Gender · Politics · Development · Democracy

## Introduction

The role of economic development in improving population health is a cornerstone of demographic research (Coale and Hoover 2015; Deaton 2003; Preston 1975; Sen 1998). At the same time, countries with similar levels of economic development can have strikingly different health profiles (Caldwell 1986; Halstead et al. 1985). Figure 1, for example, plots the level of economic development and rates of child mortality in 2010 for countries whose GDP per capita was less than US\$5,000. Two points of comparison are instructive. Among countries in the middle of the development distribution (approximately \$1,100 per capita, or 7 on the log scale), Chad has a very high rate of child mortality at 145 per 1,000, while Senegal is almost two-thirds lower at 50 per 1,000. At the very low end of economic development (\$400, or 6 on the log scale), the Central African Republic has a rate of 140 per 1,000, while Malawi has the much lower rate of 65 per 1,000. Even countries that also share similar cultures and geography have widely varying mortality risks. Countries bordering the Horn of Africa have rates ranging from 140 per 1,000 for Somalia to 60 per 1,000 for Ethiopia and 50 per 1,000 for Kenya. Given that small differences in rates translate into thousands of excess deaths, variation in mortality risk independent of economic development is fundamentally problematic. It also prompts questions about whether and how some low-income countries have managed to achieve exceptionally low mortality and whether other countries can adopt similar strategies.

An important avenue of explanation focuses on women's status (Caldwell 1986; Malhotra and Schuler 2005). Previous research has posited a number of plausible links between improved population health and increases in women's educational attainment (Austin and Noble 2014; Boehmer and Williamson 1996; Shandra et al. 2005; Shen and Williamson 1999; Ware 1984); female literacy (Grosse and Auffrey 1989; Lena and London 1993); women's labor force participation (Kawachi et al. 1999; Navarro et al. 2006); and women's access to land, loans, and property (Burroway 2012, 2016). Greater control over family and fertility is similarly beneficial, with effects seen for increased age at marriage (Finlay et al. 2011; Fraser et al. 1995) and access to contraception and other preventative health care (Austin and Noble 2014; Shen and Williamson 1999). Although the nature and existence of these pathways has been debated (see for example Batliwala and Dhanraj 2004; Desai and Alva 1998; Jackson 2003), there is some consensus in development circles that the position of women and girls should be seen as a powerful, evidence-based policy lever (Chant 2016). As a consequence, the empowerment of women and concomitant improvement in women's status is a



**Fig. 1** Child mortality rate by level of economic development in 2010, select developing countries. *Source:* World Bank Database

centerpiece of contemporary development goals and public policy (United Nations 2008, 2015).<sup>1</sup>

Our study contributes to the literature on women's status and its implications for population health by focusing on their position in political systems. Interest in the health implications of women's political status is not new. More than two decades ago, Caldwell (1986:189) noted that the 1928 Donoughmore Commission in Ceylon responded to "the near-stagnation in mortality decline" by advocating for "the franchise for women as well as men on the grounds that mothers alone cared sufficiently about their children's health to place health services high on the political agenda at each election." Although extension of franchise was the first wave of improvement in women's political status, concerns in the contemporary era largely involve improvements in women's political representation through efforts to increase the share of legislators who are women (Fallon et al. 2012; Kenworthy and Malami 1999; Paxton 1997). Whether and when such increases lead to substantive change, however, remains the subject of much debate. A small body of work has explored the realm of population health. Some research has suggested positive effects (Homan 2017; Quamruzzaman and Lange 2016; Swiss et al. 2012), whereas others have been more equivocal (Bhalotra and Clots-Figueras 2014; Boehmer and Williamson 1996; Wängnerud and Sundell 2012). Empirical assessments of the conditions under which a higher share of women in national legislatures effect change might help make sense of the inconclusive evidence. Yet, few studies to date have examined such issues.

To contribute to the evidence base, we examine the influence of changes in the percentage of a country's legislature who are women on child and maternal mortality. Drawing on the politics of presence literature (Celis et al. 2008; Phillips 1995) and its emphasis on links between descriptive and substantive representation (Wängnerud 2009), we articulate two competing ideas about the social and political conditions under which the number of female political representatives matters for population health. We then test these ideas with a heterogeneous sample of 155 developed and developing countries and fixed-effects regression models. In addition to a broader sample and more thorough statistical accounting than seen in prior work, a key innovation of our study is empirical examination of the joint influence of economic and social development and extent of democracy on conditioning the effects of women's political representation in order to highlight the social backdrop that shapes the efficacy of female political empowerment for population health.

## Women's Political Representation and Population Health

The increase in the number of women holding political office is among the most significant social trends of recent decades. Fallon et al. (2012) noted that the percentage of women in parliaments increased from 6.2 % to 17.8 % between 1975 and 2009.

<sup>1</sup> Drawing on the work of Malhotra and Schuler (2005), empowerment can be described as the agentic process of attaining the resources and opportunities necessary for an improvement in status. In contrast to other measures of gender inequality, empowerment is a dynamic concept, measured as "a progression from one state (gender inequality) to another (gender equality)" (p. 27). Similarly, Mason (1986) noted that the status of women typically reflects some aspect of gender inequality, particularly with respect to prestige, power, or access to or control over resources.

Extending the data to 2015, the percentage increased further to 20.4 %, with 42 countries above the 30 % threshold advocated by the United Nations (United Nations Equal Opportunities Commission 2003). At the same time, considerable variation is evident across countries and over time, and this has spawned research on the cultural, political, and economic factors that influence trends (Fallon et al. 2012; Kenworthy and Malami 1999; Paxton 1997; Paxton and Kunovich 2003).

A common rationale for the promotion of women's representation in politics is a presumed link between descriptive and substantive representation. Descriptive representation emphasizes the compositional similarity between representatives and those represented and the degree to which political bodies adequately reflect diversity within the relevant populace, typically with respect to demographic characteristics (Pitkin 1967). Substantive representation focuses on what policymakers do—that is, the extent to which politicians represent the interests of their constituents (Wängnerud 2009). The two types of representation are linked to the degree that legislators may be more likely or better able to represent interests that arise from shared or similar experiences (Mansbridge 1999). With respect to the gender of politicians, an influential stream of thinking articulates a politics of presence: gender differences in salient life experiences are seen to give unique orientation and value to the presence of female politicians (Phillips 1995).

Political theorists who have sought to explain why, in a representative democracy, the gender of representatives should matter for the policy agenda have had to engage with two sequential questions (Wängnerud 2009). First, can women be thought of as having certain shared interests? Researchers attempting to conceptualize women's interests have suggested that the gendered division of labor and other aspects of gender orders create needs that are, to some extent, shared across otherwise diverse groups of women (Phillips 1998; Young 1994, 2002). In general, those needs that are amenable to policy—for example, surrounding childbearing, sexual and gender-based violence, the care and education of children, and access to paid labor—may form the basis for a broad set of women's political interests.

Second, even if we assume that it is useful to think in terms of women's interests, why would politicians who are women better represent those interests? Some of the most compelling arguments focus on the consequences of historical and institutional exclusions that limit access to the “battleground for contested ideas” (Phillips 1994:76). A number of previous studies have approached the question empirically, asking whether female politicians reorient the policy agenda so that “women's interests” figure more prominently and whether their presence is associated with an improvement in the circumstances of women and children. Studies covering a range of periods and geographical settings consistently find that female politicians prioritize issues thought to be of particular importance to women, including social welfare policy, family policy, and gender equality issues (Childs and Krook 2008; Jones 1997). For example, researchers in the United States found that “women were more likely to give priority to public policies related to their traditional roles as caregivers in the family and society—e.g., policies dealing with children and families and health care” (Center for the American Woman and Politics 1991:4; see also Childs and Krook 2006, 2009; Kittilson 2008; Schwindt-Bayer 2006). Evidence also suggests that increases in the number of female politicians are associated with greater spending on social programs (Bolzendahl 2009; Bolzendahl and Brooks 2007; Brady 2009; Halim et al. 2016b). Because female politicians are more likely to prioritize maternal and child well-being, we might expect increases in women's representation to translate into better population health, particularly for women and children.

Empirical evidence, however, is somewhat equivocal. Boehmer and Williamson's (1996) study of 96 developing countries around 1990 found that the percentage of women in parliaments had a small negative association with infant mortality. The relationship, however, was fully attenuated with controls for women's educational attainment, suggesting that the number of female politicians might proxy greater gender equality in society more generally. Bhalotra and Clots-Figueras's (2014) study of electoral districts in India between 1967 and 2001 found wide-ranging associations for increases in the number of women in state legislatures, but associations were stronger for neonatal mortality than for infant mortality and only with an instrumental variable specification (i.e., whether elections were close). Quamruzzaman and Lange's (2016) analysis of DHS data for 52 countries found negative associations of women's representation on infant mortality, as did Homan's (2017) study of gender inequality in U.S. state legislatures between 1990 and 2012. In contrast, Wängnerud and Sundell's (2012) study of Swedish local elected assemblies between 1970 and 2010 found no significant relationships with women's health. In arguably the most comprehensive study to date, Swiss et al. (2012) examined panel data for 102 developing countries spanning 1980 to 2010 in five-year intervals, finding that the percentage of women in parliaments is associated with greater infant and child survival. Against this backdrop, we hypothesize the following:

*Hypothesis 1:* Increases in the percentage of women in parliament will be associated with decreases in mortality risk net of other indicators of women's status or economic and social development.

In an effort to account for contradictory conclusions, some work has suggested that the representation of women's interests might be improved with a "critical mass" of female representatives (Childs and Krook 2006, 2008; Dahlerup 2006). Swiss et al.'s (2012) study of infant survival explicitly modeled quantile differences in the percentage of women in parliaments and provided some evidence of threshold effects. Few other studies however have empirically examined the critical mass hypothesis, particularly in relation to population health. Nonetheless, the United Nations Equal Opportunities Commission (2003) advocates for a minimum of 30 % women in governmental leadership positions, with an overall goal of parity in order to foster both gender equality and social development. We consider the critical mass question in our study with the following orienting hypothesis:

*Hypothesis 2:* The negative association between increases in the percentage of women in parliament and mortality risk will be strongest when the share of female legislators is sufficiently high (30 % or more) net of other indicators of women's status or economic and social development.

## Contingencies With Respect to Political Context and Social Development

In theory, politicians create policy and influence social life by interpreting needs, shifting budgets, and marshaling resources on issues that matter to them (Pitkin 1967). Yet, political, economic, and social conditions both facilitate and inhibit such

processes, and these factors may introduce important contingencies for the efforts of female legislators to effect change (Mansbridge 1999, 2003). In the realm of political organization, a considerable amount of work has focused on the extent of democracy and its consequences (Franco et al. 2004; Ross 2006). Here, the key expectation is that political systems that are more democratic should promote greater responsiveness to constituents' concerns and foster better population health (Swiss et al. 2012). In settings where greater democratic institutionalization allows for more open and competitive systems of candidate recruitment, institutionalized constraints on the exercise of executive power, and greater opportunities to scrutinize and push for policy proposals, we might expect increases in women's political representation to be more efficacious.

A second important contingency is the extent of development. In terms of economic development, the public economics of nation-states is relatively straightforward. Because governments amass revenues through processes of extraction—extraction from exploitation of natural resources, from corporate taxation, and from income tax (Atkinson and Stiglitz 2015)—economic development and government expenditure are directly related: countries with larger GDP per capita have greater capacity. Extrapolating from this, one would expect that the efficacy of women's political representation will increase when more resources are available and, at least hypothetically, competition for scarce resources is reduced.

Although these arguments suggest that the ability of female legislators to steer resources and enact policies is enhanced when greater economic development is combined with a greater extent of democracy, an alternative hypothesis begins from the standpoint that gendered institutional contexts can impede efforts of descriptive representatives to effect change (Childs and Krook 2009). In some contexts, descriptive representatives—particularly activists representing the interests of historically excluded groups—may have unique opportunities to exert influence under conditions of political-economic vulnerability and transition, when institutions are being designed or redeveloped. “By successfully intervening to insert new actors, new values, and new rules into new institutions, reformers may profoundly influence the future developments of an institution . . . [T]he goal is to set off fledgling institutions along progressive paths, thus counteracting . . . bias and . . . power imbalances found in most traditional political institutions” (Mackay 2014:549). Moreover, interests in contexts of institutional transition may be relatively “uncrystallized” so that political parties and interest groups lack a clear strategic position or approach. In the absence of better information, the shared experiences of descriptive representatives can provide the only signal that a political actor is likely to respond to particular issues as a voter would (Mansbridge 1999).

From an empirical perspective, the relevant contextual factors can be difficult to observe or measure directly (Waylen 2014), yet indicators of the level of economic and social development and the extent of democracy may be suitable proxies. Countries with a lower extent of democracy are especially vulnerable to political instability, such as outbreaks of armed conflict, unexpected changes in leadership, or adverse regime changes (e.g., a seizure of power by a personalistic or military leader) (Marshall and Cole 2014:21). Yet, such regimes are also more likely to initiate substantial political reforms with opportunities for institutional engineering and innovation (Mackay 2014). Still, because of legacies of conflict, instability, and separatism, these countries may also face challenges of trust and communication that impair the substantive



representation of some groups, particularly those historically marginalized (Mansbridge 1999). Given that women have traditionally been excluded from political participation, particularly in malfunctioning democracies that have tended to adopt suffrage later and have been more likely to have rules barring women from political office (Martin 2000; Nelson and Caudhuri 1994), increased numbers of women in the political arena might be expected to help establish ability to rule and increase the polity's de facto legitimacy (Mansbridge 1999:628).

Moreover, when democracy is not well functioning, many “democratic” apparatuses, such as competitive elections and freedom of press, are either underdeveloped or missing. As a consequence, we may expect that malnourished children, poor hygiene, or limited maternal care might not be “picked up” by the press or included in the policy agenda of politicians who compete for office. Female legislators in these contexts may act as a unique and innovative voice for such issues. To the extent that weaker democracy signals democratic deficits whereby some ideas are difficult to express or are silenced and the range of perspectives and possibilities curtailed, descriptive representatives can serve an ameliorative function. Thus, we can think of women representatives as a “substitute for” rather than a “complement of” democracy. As a result, we would expect that female representatives would be more consequential in low democratic contexts.

A parallel argument emerges when considering extent of economic and social development. Because a sufficient economic surplus is a prerequisite for the development of a welfare state and the government bureaucracy that supports it (Quadagno 1987; Wilensky 1974), social welfare programs are likely to be underdeveloped and interests are likely to be less entrenched when development is low. Such contexts could indicate an opportunity for institutional design, when descriptive representatives could create social welfare infrastructures rather than having to work within existing biases and constraints and/or fight to amend them. Still, considerable criticism surrounds economic development, particularly when measured by indicators like GDP per capita, as a catchall indicator of development. As Sen (1988:13) noted, “even though an expansion of GNP, given other things, should enhance the living conditions of people, . . . there are many other variables that also influence the living conditions, and the concept of development cannot ignore the role of these other variables.” In this respect, the literature identifies other aspects of development, particularly with respect to income, education, other indicators of women's status, and urbanization. Such a view highlights the need to consider broader-based and alternative indicators of social development instead of or alongside GDP per capita.

Given the different expectations of the effectiveness of female political representation under different political-economic contexts, we offer the following competing hypotheses:

*Hypothesis 3:* Increases in the percentage of women in parliament should reduce mortality to a larger extent in countries characterized by a high extent of democracy and high social development.

*Hypothesis 4:* Increases in the percentage of women in parliament should reduce mortality to a larger extent in countries characterized by a low extent of democracy and low social development.



Empirical evidence of contingencies in the effects of women in parliament on population health is scant and contradictory. Boehmer and Williamson (1996) examined the interaction of the percentage of women in parliament and economic development and found no significant contingencies. In contrast, Swiss et al. (2012) reported that higher proportions of female legislators are most strongly associated with health when economic development and women's secondary enrollment are low. At the same time, they reported no significant interaction with extent of democracy. The question of whether joint influences of political and social development exist has not been considered. Whether other aspects of social development are implicated has also not been considered. Consequently, we know less than we could about women's representation, democratic institutionalization, and development and about how these factors might shape population health. We explicitly pursue such issues in the following empirical analyses.

## Methods

### Data

Our broadest sample for cross-national mortality covers 155 countries, spans 1990 to 2014, and includes more than 2,300 country-years. We have been deliberately inclusive in our selection of countries and have much broader coverage of countries than seen in previous work. Our sample also captures the third wave of democratization that occurred among former Soviet countries after the break up of the USSR, as well as sub-Saharan Africa through the 1990s (Diamond 1996). The only country-years that were excluded were those with missing information on select measures. The average number of years per country is 15.4. A full list of countries in the analytic sample is shown in Table S1 in the online appendix.

### Measures

Unless otherwise indicated, measures were taken from the World Bank (2017) database. Indicators of population health include rates of neonatal mortality (less than 30 days), infant mortality (less than 1 year of age), child mortality (less than 5 years of age), and maternal mortality (modeled per 100,000 births). Although mortality data from some countries have been problematic, the original collection agencies—including the UN Inter-agency Group for Child Mortality Estimation, the UN Population Division, and the World Health Organization (WHO)—have developed extensive protocols for internal and external validation (Ahmed et al. 2014; WHO Department of Information, Evidence and Research 2016; You et al. 2015). We use the multiple outcomes to assess robustness of results. Although these outcomes clearly differ in etiology and social dynamics, we view them as complementary measures of population health.

Our focal variable of interest is women's political representation, which we measure as the percentage of the national parliament—specifically, a country's "lower house"—that are women in January of each year between 1990 and 2014. The data were compiled by the Inter-Parliamentary Union (2016) on the basis of information provided by 170 individual national parliaments. Given that the idea of a critical mass has gained wide currency among politicians, the media, and international organizations (Childs and Krook 2008:725), we

differentiate country-periods for which the proportion of women in parliament is (a) less than 10 % (the reference category); (b) between 10 % and 20 %; (c) between 20 % and 30 %; or (d) greater than 30 %. The latter category is based on the United Nations Equal Opportunities Commission (2003) recommendation. Because any cutoff point is somewhat arbitrary, we conducted robustness checks at all thresholds above 15 % women in parliament, and the results reported here are consistent when the upper boundary is fixed at any value above 25 %. In our data, 38 % of country-periods have fewer than 10 % legislators who are women; 34 % have between 10 % and 20 %; 16 % have between 20 % and 30 %; and 11 % of country-periods have 30 % or more.

Because a key focus of our research is health implications of political and developmental context, our initial models include measures of economic development and extent of democracy. For the former, we include (logged) gross domestic product per capita in current U.S. dollars. The latter is measured as the extent of democracy based on the Polity IV index (Polity IV Project 2016). The Polity scheme documents executive recruitment, checks and constraints on executive authority, and the extent and efficacy of political competition; it includes information on institutions of the central government or political groups acting or reacting within the scope of that authority. It is worth noting that this measure focuses on the procedures and institutional setup of the state that allow genuine political competition and meaningful constraints on the authority of the executive. It does not directly measure whether all political interests are represented, and a country's score would not change automatically if the proportion of female representatives increased. Consistent with this and with prior work, the percentage of women in parliament is not directly correlated with the extent of democracy and has only a weak relationship with economic development (Fallon et al. 2012; Kenworthy and Malami 1999; Paxton 1997). The index is a 21-point scale, with the key differentiations being autocracies (−10 to −6), anocracies<sup>2</sup> (−5 to 5), and democracies (6 to 10).<sup>3</sup>

In addition, we control for or condition on other aspects of social development, as well as other potential determinants of mortality risk. Women's labor force participation and gender parity in gross secondary enrollment capture other aspects of women's social standing. Improvements in both are recognized as indicators of women's empowerment (UN Women 2017) and hence control for mortality reductions stemming from changes in women's status in realms other than politics. Because educational expansion is often associated with improvements in population health (Baker et al. 2011), we include a measure of the extent of mass education, which is a factor score based on a combination of gross secondary enrollment (of both males and females) and the average years of education completed (UNESCO 2016). We also capture different types of demographic risks through the crude birth rate, the dependency ratio, and the percentage of the population living in urban settings. We also include a measure of exposure to war that indexes the total extent of interstate and civil conflict for a given country in a given year (Marshall 2005). Finally, the logged number of NGOs in a given country-year is included (Longhofer et al. 2016). In follow-up analyses of alternative specifications, we consider

<sup>2</sup> "Governments [that] are neither fully democratic nor fully autocratic . . . [are] often [an] incoherent mix of democratic and autocratic traits and practices (Marshall and Cole 2014:21)."

<sup>3</sup> To assess the robustness of our results, we also examined political effects with respect to the Freedom House index of political rights and civil liberties (see [https://freedomhouse.org/report/freedom-world/freedom-world-2015#.Wyf8shJKj\\_R](https://freedomhouse.org/report/freedom-world/freedom-world-2015#.Wyf8shJKj_R)), a combined factor score of the Polity IV and Freedom House measures, and the Herfindahl index of concentration of political power. Results were substantively similar for all measures.

**Table 1** Summary statistics (panels = 2,387, countries = 155)

Variables	Mean	SD	Min.	Max.
Neonatal Mortality	16.197	13.930	1.000	68.900
Infant Mortality	30.563	30.312	1.600	159.700
Child Mortality	43.510	49.994	2.000	328.200
Maternal Mortality	194.930	293.131	3.000	2,700.000
Percentage of Women in Parliament				
Less than 10 %	0.380	0.485	0.000	1.000
10 % to 19.9 %	0.344	0.475	0.000	1.000
20 % to 29.9 %	0.160	0.367	0.000	1.000
30 % or more	0.116	0.320	0.000	1.000
Extent of Democracy	4.717	6.148	−10.000	10.000
Logged GDP per Capita	8.232	1.638	4.664	11.674
Crude Birth Rate	21.991	11.522	7.600	55.122
Dependency Ratio	62.326	18.437	17.031	112.683
Extent of Mass Education	0.001	1.407	−3.162	2.947
Gender Parity in Gross Secondary Enrollment	0.963	0.102	0.488	1.295
Female Labor Force Participation	50.532	15.727	9.244	90.788
Urbanization	57.534	22.587	5.416	100.0
Exposure to War	0.450	1.307	0.000	10.0
Logged NGOs	7.067	0.972	0.000	8.747
Logged GNI per Capita <sup>1</sup>	8.202	1.643	4.700	11.560

Note: Logged GNI per capita is based on 2,334 panels because of missing data.

(logged) gross national income as a substitute for GDP per capita. Descriptive statistics for all measures are shown in Table 1.

## Statistical Analysis

Given our primary interest in fluctuations in mortality with changes in women's representation, our regression models include country dummy variables to hold constant initial country conditions that could predispose countries for higher mortality. This strategy also controls for any time-invariant coding biases that may exist because of variation in the structure and practices of country-level surveillance systems. We also include year dummy variables to capture trends over time. Thus, our initial model, which tests the first two hypotheses, is

$$\begin{aligned}
 MR_{it} = & \alpha + \gamma_{1k} FEMREP_{kit-1} + \beta_1 LNGDP_{it} + \beta_2 DEMOC_{it} + \beta_3 CBR_{it} + \beta_4 DEP_{it} \\
 & + \beta_5 EME_{it} + \beta_6 GPGSE_{it} + \beta_7 FLFP_{it} + \beta_8 URB_{it} + \beta_9 WAR_{it} \\
 & + \beta_{10} LNNGO_{it} + \mu_i + \nu_t + \varepsilon_{it},
 \end{aligned}
 \tag{1}$$

where  $i$  is country, and  $t$  is year.  $MR$  is a mortality risk indicator,  $FEMREP_k$  is the proportion of lower house representatives who are women divided into four  $k$  categories (less than 10 %, 10 % to 19.9 %, 20 % to 29.9 %, and 30 % or more),  $LNGDP$  is logged GDP per capita,  $DEMOC$  indicates extent of democracy,  $CBR$  is the crude birth rate,  $DEP$  is the dependency ratio,  $EME$  is the extent of mass education,  $GPGSE$  is gender parity in gross secondary enrollment,  $FLFP$  is women's labor force participation,  $URB$  is the percentage of the population living in urban settings,  $WAR$  is the index of exposure to war, and  $LNGO$  is the natural log of the number of NGOs. The model also includes  $\mu$  as a set of country fixed effects,  $\nu$  as a set of year fixed effects, and  $\varepsilon$  as the error term. Because it takes time for policies to be passed and implemented and to have an observed effect on mortality outcomes, we lag the effects of female political representation. Based on evidence from recent studies that inappropriately long lags can introduce substantial bias and errors of inference (Vaisey and Miles 2017), we use a short lag ( $t - 1$ ). We did, however, assess robustness using models with contemporaneous effects as well as lags of two, three, four, five, and 10 years and achieved virtually identical results. For estimated parameters,  $\alpha$  is a constant, and the  $\gamma$ s and  $\beta$ s are coefficients.

We offer three rationales for a fixed-effects approach. First, it is well recognized that fixed-effects models are better able to control for unobserved heterogeneity that can bias coefficients (Halaby 2004). With the exception of Homan (2017), prior work has used either a standard ordinary least squares (OLS) or random-effects approach, raising concerns of bias due to omitted time-stable factors. Second, a short-term horizon among elected officials is expected because politicians logically recognize their ephemeral status given finite election cycles (typically four-year cycles in length) and hence need to produce policy outcomes, particularly those that are attributable to their own actions, in order to have a compelling case for reelection (Mansbridge 2003). Finally, Sargan-Hansen tests that compare fit of a random-effects versus fixed-effects specification when robust standard errors are used support the latter specification (see Arellano 1993).

To capture potential political-developmental contingencies, our Hypotheses 3 and 4, we elaborate the initial model by adding product terms:

$$\begin{aligned}
 MR_{it} = & \alpha + \gamma_{1k}FEMREP_{kit-1} + \beta_1LNGDP_{it} + \beta_2DEMOC_{it} + \beta_3CBR_{it} + \beta_4DEP_{it} \\
 & + \beta_5EME_{it} + \beta_6GPGSE_{it} + \beta_7FLFP_{it} + \beta_8URB_{it} + \beta_9WAR_{it} \\
 & + \beta_{10}LNGO_{it} + \mu_i + \nu_t + \varepsilon_{it} + \beta_{11}(LNGDP_{it} \times DEMOC_{it}) \\
 & + \gamma_{2k}(FEMREP_{kit-1} \times LNGDP_{it}) + \gamma_{3k}(FEMREP_{kit-1} \times DEMOC_{it}) \\
 & + \phi_k(FEMREP_{kit-1} \times LNGDP_{it} \times DEMOC_{it}),
 \end{aligned} \tag{2}$$

where the terms are as before but with additional  $\gamma$ s and  $\beta$ s for the two-way interactions and  $\phi$  coefficients to capture the vector of three-way interactions of women's representation categories, extent of democracy, and economic development.<sup>4</sup> In subsequent models, we substitute different indicators of economic and social development for logged GDP per capita.

<sup>4</sup> To ensure adequate data points of support, we examined the cross-classification of female political empowerment, extent of democracy, and economic development. We found a minimum of 400 country-years in each of the relevant cross-classifications.

We estimate regression models using the XT protocol in Stata 14.1, and we use cluster-corrected robust standard errors. Improvement in model fit with the contingency models is assessed by the change in the Bayesian information criterion (BIC) statistic between more complex and less complex (nested) models. Because the interpretation of  $n$ -way interactions is complicated, we calculate marginal effects to show estimated mortality rates at different levels of women's representation, development, and extent of democracy.

## Results

Our analyses begin by examining main effects (Table 2). In the case of neonatal mortality, all coefficients are negative and become increasingly negative with higher proportions of female legislators, but none are statistically significant. The same applies to child mortality. In the case of infant mortality, the coefficients also become more negative with increasing percentages of female legislators, but the coefficient for 30 % or more threshold is statistically significant ( $b = -5.459$ ,  $p < .05$ ). A similar pattern is seen for maternal mortality, but here the coefficients are statistically significant for both the 20 % to 29 % ( $b = -24.171$ ,  $p < .01$ ) and the 30 % or more thresholds ( $-66.716$ ,  $p < .05$ ). Both extent of democracy and economic development have reasonably robust negative associations with mortality rates. Moreover, both crude birth rate and exposure to war are positively associated with mortality rates, whereas mortality rates are lower in relation to gender parity in gross secondary enrollment. Other variables largely show null associations across outcomes. In general, the findings provide no support for Hypothesis 1 and, at best, marginal support for Hypothesis 2.

Because associations that are conditional on political, economic, and social-developmental context are masked in models that assume that the association is uniform, we next fit a series of models with two- and three-way interactions and assess change in goodness of fit. Focusing first on GDP per capita (see Table 3), the inclusion of each two-way interaction (i.e., women's representation by extent of democracy, women's representation by economic development, and extent of democracy by economic development) significantly improves fit over the main effects model. Raftery (1995) suggested that a change in BIC of more than 10 indicates very strong support for the models with the lower value; we have change values ranging from  $-93.9$  to  $-175.4$  for neonatal mortality, from  $-173.0$  to  $-378.9$  for infant mortality, from  $-170.4$  to  $-374.7$  for child mortality, and from  $-181.4$  to  $-392.1$  for maternal mortality. With the inclusion of the three-way interaction, women's representation by extent of democracy by economic development, BIC values range between 395 to 802 less than the main effects model and are over 200 less than any of the two-way interaction models.

For the other indicators of economic and social development, the corresponding BIC statistics for each model are available in the online appendix, Table S2. To summarize these findings, the models with two-way interactions provide significant improvements in fit over the main effects model in all cases except one (out of 60); changes in BIC values range from  $-18.4$  to  $-528.6$ , with most exceeding 100. When the three-way interaction is included, almost all resulting differences exceed  $-200$  compared with the models including two-way interactions. Thus, the BIC statistics indicate uniformly strong support for the models with three-way interactions across all development indicators. To conserve space, we show the corresponding

**Table 2** Maximum likelihood fixed-effect coefficients: Mortality risk regressed on female political empowerment, political infrastructure index, economic development, and select control variables

	Neonatal Mortality	Infant Mortality	Child Mortality	Maternal Mortality
Percentage of Women in Parliament (ref. = < 10 %)				
10 % to 19 %	-0.177 (0.338)	-0.473 (0.862)	-1.634 (1.805)	-6.071 (8.137)
20 % to 29 %	-0.783 (0.438)	-1.624 (1.222)	-3.507 (2.236)	-24.171* (11.650)
30 % or more	-1.175 (0.817)	-5.459* (2.739)	-8.977 (5.046)	-66.716* (31.785)
Extent of Democracy	-0.118 (0.065)	-0.619*** (0.197)	-1.246*** (0.387)	-4.927** (1.833)
Logged GDP per Capita	-2.524*** (0.389)	-6.265*** (0.959)	-9.994*** (1.818)	-28.240*** (10.287)
Crude Birth Rate	0.248* (0.109)	0.769** (0.277)	1.297* (0.528)	7.843*** (2.425)
Dependency Ratio	0.025 (0.045)	-0.036 (0.137)	-0.380 (0.292)	-1.036 (1.006)
Extent of Mass Education	-1.226 (0.634)	-1.046 (1.507)	-0.270 (2.901)	25.285 (16.274)
Gender Parity in Secondary Enrollment	-34.002*** (5.295)	-88.292*** (13.660)	-181.107*** (29.377)	-707.063*** (107.137)
Female Labor Force Participation	0.061 (0.049)	0.060 (0.130)	-0.115 (0.298)	1.502 (1.182)
Urbanization	-0.058 (0.078)	0.055 (0.208)	-0.020 (0.396)	-1.231 (2.282)
Exposure to War Index	0.404** (0.154)	0.940* (0.476)	1.591 (0.828)	10.944* (5.487)
Logged NGOs	-0.433** (0.205)	-0.294 (0.452)	-0.038 (0.770)	4.330 (3.360)
Constant	66.696*** (11.009)	151.903*** (26.611)	309.844*** (62.665)	996.429*** (196.287)
Number of Observations	2,387	2,387	2,387	2,387
Number of Countries	155	155	155	155

Note: Robust standard errors are shown in parentheses.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

coefficients for the logged GDP per capita model in Table 4 and report the coefficients for models with other social and economic development indicators in the online appendix, Tables A3.1 to A3.5.

Interpretation of parameters in models with higher-order interactions is complicated because of the contingent nature of the implied associations. To illustrate the meaning of these interactions, we estimate mortality rates based on the model for each category

**Table 3** Bayesian information criterion (BIC) goodness-of-fit statistics: Hierarchical interaction models

Model	BIC	$\Delta$ BIC
1. Neonatal Mortality		
a. Main effects	9,916.8	—
b. Percentage of women in parliament $\times$ Economic development	9,714.4	−175.4
c. Economic development $\times$ Extent of democracy	9,767.3	−149.5
d. Percentage of women in parliament $\times$ Extent of democracy	9,822.9	−93.9
e. Percentage of women in parliament $\times$ Extent of democracy $\times$ Economic development	9,521.4	−395.4
2. Infant Mortality		
a. Main effects	14,919.0	—
b. Percentage of women in parliament $\times$ Economic development	14,540.1	−378.9
c. Economic development $\times$ Extent of democracy	14,641.4	−277.6
d. Percentage of women in parliament $\times$ Extent of democracy	14,746.0	−173.0
e. Percentage of women in parliament $\times$ Extent of democracy $\times$ Economic development	14,159.6	−759.4
3. Child Mortality		
a. Main effects	18,029.9	—
b. Percentage of women in parliament $\times$ Economic development	17,655.2	−374.7
c. Economic development $\times$ Extent of democracy	17,756.4	−273.5
d. Percentage of women in parliament $\times$ Extent of democracy	17,859.5	−170.4
e. Percentage of women in parliament $\times$ Extent of democracy $\times$ Economic development	17,267.3	−762.6
4. Maternal Mortality		
a. Main effects	25,721.7	—
b. Percentage of women in parliament $\times$ Economic development	25,329.6	−392.1
c. Economic development $\times$ Extent of democracy	25,540.3	−181.4
d. Percentage of women in parliament $\times$ Extent of democracy	25,449.8	−271.9
e. Percentage of women in parliament $\times$ Extent of democracy $\times$ Economic development	24,919.2	−802.5

of women's representation when extent of democracy is fixed at low (0, or weak anocracy; e.g., contemporary Haiti, Libya, or Somalia) and high (7, or moderately strong democracy; e.g., contemporary Bolivia, Pakistan, or Thailand) values, when development is fixed at low and high values (typically  $\pm 1$  standard deviation from the mean), and when all other variables are held at their means. For our initial example, we estimate mortality rates with logged GDP set at the values of 7 (low) and 9 (high). We deliberately use values that are realistic given the distributions of country-years by extent of democracy and economic development (i.e., estimation is made where statistical support is strong). Given that our outcomes are complementary indicators of population health, we describe the results for infant mortality in detail and then note similarities and differences with respect to the other outcomes. These are shown in panels a to d of Fig. 2.



**Table 4** Maximum likelihood fixed-effect coefficients: Mortality risk regressed on female political empowerment, political infrastructure index, logged GDP per capita, and their interaction, along with select control variables

	Neonatal Mortality (1)	Infant Mortality (2)	Child Mortality (3)	Maternal Mortality (4)
Logged GDP per capita (development indicator)	-3.491*** (0.456)	-10.046*** (1.360)	-17.980*** (2.702)	-62.512*** (12.929)
Percentage of Women in Parliament (ref. = <10 %)				
10 % to 19 %	-1.213 (2.973)	-1.615 (8.499)	-17.475 (17.980)	-81.654 (93.163)
20 % to 29 %	-4.678 (2.834)	-30.209*** (8.420)	-70.561*** (15.601)	-381.870*** (64.587)
30 % or more	-17.845*** (4.380)	-97.316*** (11.060)	-192.376*** (20.458)	-1,125.844*** (189.076)
Extent of Democracy	-0.557* (0.287)	-3.045*** (0.715)	-6.317*** (1.473)	-27.227*** (9.207)
Interactions				
Extent of democracy × Percentage of women in parliament: 10 % to 19 %	-0.887** (0.360)	-2.202** (0.860)	-3.229** (1.633)	-9.664 (9.138)
Extent of democracy × Percentage of women in parliament: 20 % to 29 %	-0.972*** (0.341)	-0.254 (0.843)	-0.125 (1.535)	22.864*** (7.723)
Extent of democracy × Percentage of women in parliament: 30 % or more	0.229 (0.577)	6.193*** (1.502)	13.788*** (2.629)	96.174*** (28.901)
Development indicator × Percentage of women in parliament: 10 % to 19 %	0.177 (0.395)	0.147 (1.168)	2.147 (2.396)	10.851 (12.446)
Development indicator × Percentage of women in parliament: 20 % to 29 %	0.426 (0.395)	3.672*** (1.101)	8.761*** (2.028)	46.100*** (9.241)
Development indicator × Percentage of women in parliament: 30 % or more	2.051*** (0.570)	11.582*** (1.458)	23.182*** (2.680)	132.210*** (21.576)
Extent of democracy × Development indicator	0.079** (0.039)	0.385*** (0.097)	0.801*** (0.190)	3.480*** (1.195)
Extent of democracy × Development indicator × Percentage of women in parliament: 10 % to 19 %	0.094* (0.047)	0.257* (0.120)	0.353 (0.227)	0.938 (1.259)
Extent of democracy × Development indicator × Percentage of women in parliament: 20 % to 29 %	0.114* (0.045)	0.002 (0.100)	-0.074 (0.180)	-2.847*** (1.014)
Extent of democracy × Development indicator × Percentage of women in parliament: 30 % or more	-0.030 (0.066)	-0.750*** (0.165)	-1.656*** (0.285)	-11.227*** (3.118)
Control Variables				
Crude birth rate	0.265*** (0.095)	0.793*** (0.233)	1.313*** (0.444)	7.313*** (2.061)
Dependency ratio	-0.010 (0.042)	-0.178 (0.127)	-0.664** (0.277)	-2.108** (0.942)
Extent of mass education	-1.510** (0.623)	-2.476* (1.403)	-3.527 (2.641)	7.921 (11.475)

**Table 4** (continued)

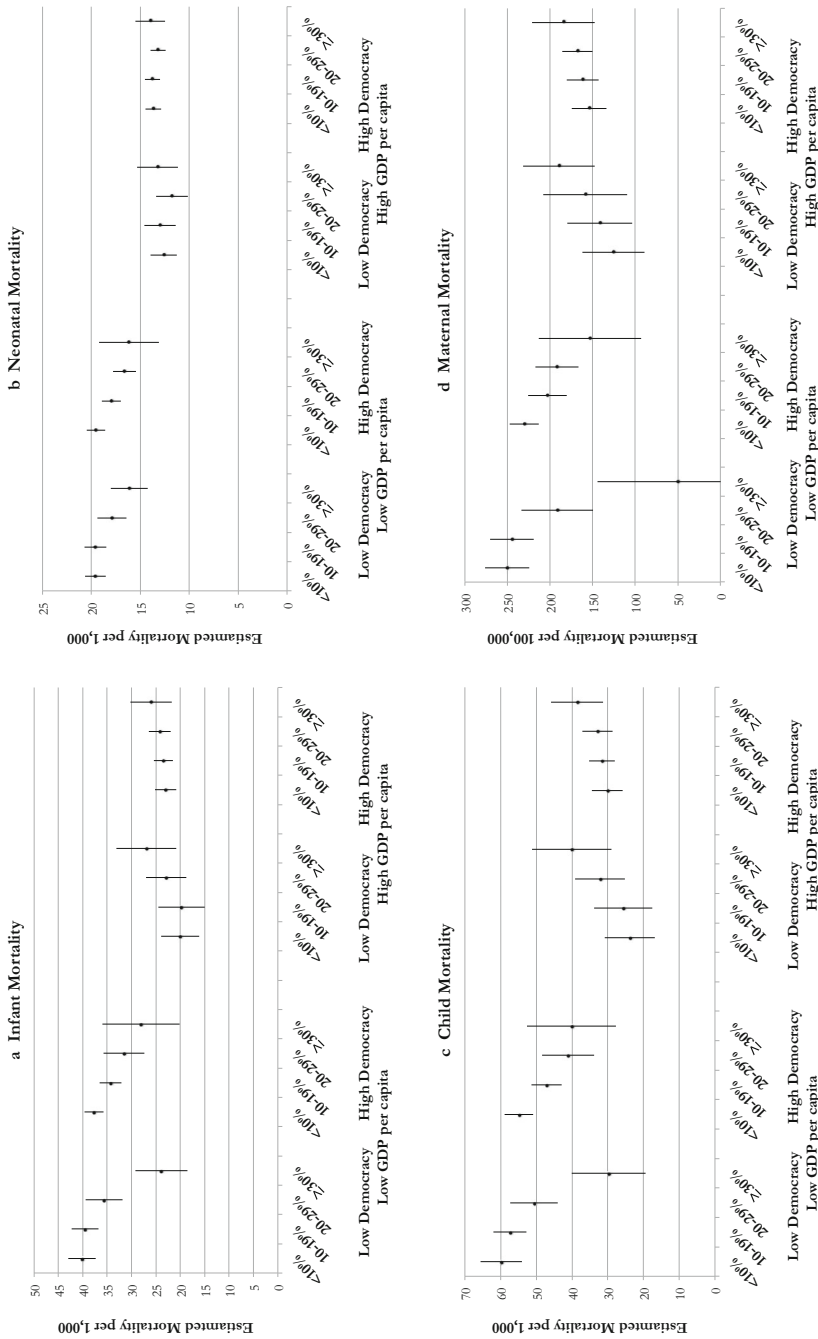
	Neonatal Mortality (1)	Infant Mortality (2)	Child Mortality (3)	Maternal Mortality (4)
Gender parity in secondary enrollment	-28.202*** (4.524)	-66.762*** (11.234)	-139.705*** (23.331)	-513.368*** (92.497)
Female labor force participation	-0.027 (0.047)	-0.211* (0.112)	-0.625** (0.273)	-0.688 (0.718)
Urbanization	-0.029 (0.067)	0.120 (0.166)	0.096 (0.311)	-0.729 (1.535)
Exposure to war index	0.162 (0.103)	0.068 (0.291)	0.042 (0.529)	3.134 (3.253)
Logged NGOs	-0.587*** (0.209)	-0.912** (0.421)	-1.226* (0.738)	-1.019 (2.413)
Logged GDP per capita	—	—	—	—
Constant	73.087*** (10.150)	178.589*** (25.084)	367.419*** (61.787)	1,235.500*** (176.945)
Number of Observations	2,387	2,387	2,387	2,387
Number of Countries	155	155	155	155

Note: Robust standard errors are shown in parentheses.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

Estimated associations for increased women's political representation and infant mortality are pronounced (see Panel a, Fig. 2). Here, the estimated mortality rate is 24 per 1,000 when women hold at least 30 % of parliamentary seats and levels of democracy and economic development are low. This is significantly lower than all other estimates in contexts of low development and low democracy (ranging from 35 to 40 per 1,000). It is also statistically indistinguishable from any of the mortality estimates at higher levels of economic development (20 to 30 per 1,000). The difference in estimated mortality risk when the proportion of female legislators is lowest and highest (40 vs. 24 per 1,000) corresponds to approximately 53 % of a standard deviation for infant mortality ( $\approx 30$ ), a magnitude that would be considered large by conventional metrics. Finally, when women hold at least 30 % of parliamentary seats, improved mortality outcomes are also observed in contexts of high democracy and low development. The estimated mortality rate is somewhat higher (28 per 1,000) than that in contexts of low democracy and low development, but it is still significantly lower than when women hold less than 10 % of parliamentary positions.

For the other outcomes, four points are noteworthy. First, associations are somewhat weaker for neonatal mortality (see panel b, Fig. 2). There is still evidence of a 30 % threshold effect in contexts of low democracy and low development (16 per 1,000), which is less than that seen when women's political representation is lower (20 per 1,000). Compared with the other outcomes, however, the magnitude of the differences is smaller. Second, the pattern of estimated rates is very similar for child and maternal mortality, with strong evidence of health benefits when women hold at least 30 % of parliamentary seats in contexts of low democracy and development. Here, the estimated



**Fig. 2** Estimated marginal effects: Predicted mortality rate by female political representation, extent of democracy, and economic development with other covariates held at their means

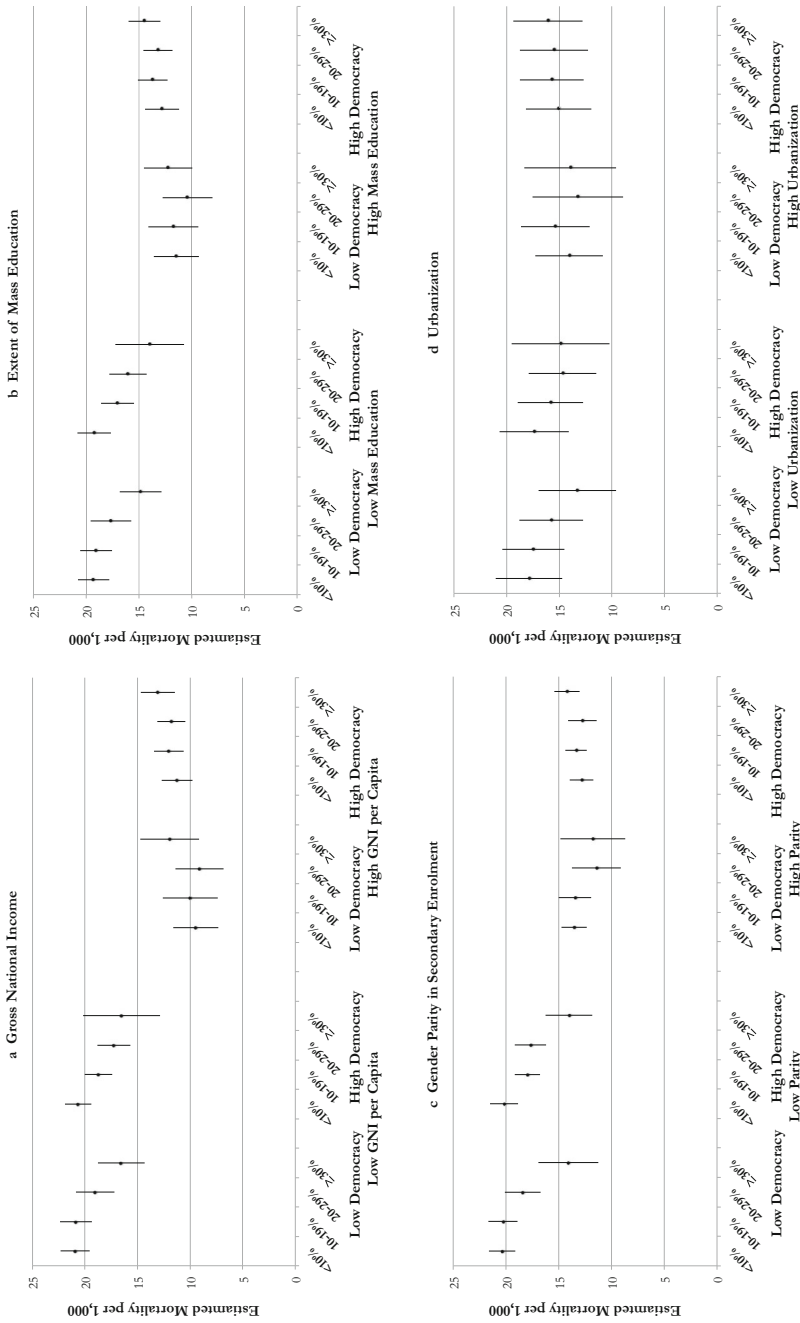
rates are 30 per 1,000 (see panel c, Fig. 2) and 50 per 100,000 (see panel d, Fig. 2). In relation to women's low political representation in this context, the differences in estimated effects are large (30 vs. 60 per 1,000 for child mortality, and 50 vs. 250 per 100,000 for maternal mortality) and correspond to more than 60 % of a standard deviation in the outcomes ( $\approx 50.0$  and 293, respectively). Third, the population health gains associated with 30 % or more women in parliament generally offset liabilities associated with low economic development. For both child and maternal mortality, all estimated rates when GDP per capita is high either are not significantly different than that at the 30 % level of representation in contexts of low democracy and low development (i.e., confidence intervals overlap) or are actually higher (i.e., 23 to 40 per 1,000 for child mortality, and 140 to 190 per 100,000 for maternal mortality). Finally, estimated mortality is also comparatively lower in contexts of high democracy and low development when women hold at least 30 % of parliamentary seats (compared with 0 % to 10 % of seats), although the estimated mortality advantage is considerably smaller than in contexts of low democracy and low development (40 vs. 55 per 1,000 for child mortality, and 150 vs. 240 per 100,000 for maternal mortality). In general, these findings provide strong support for Hypothesis 4 and are contrary to the expectations of Hypothesis 3.

## Alternative Specifications

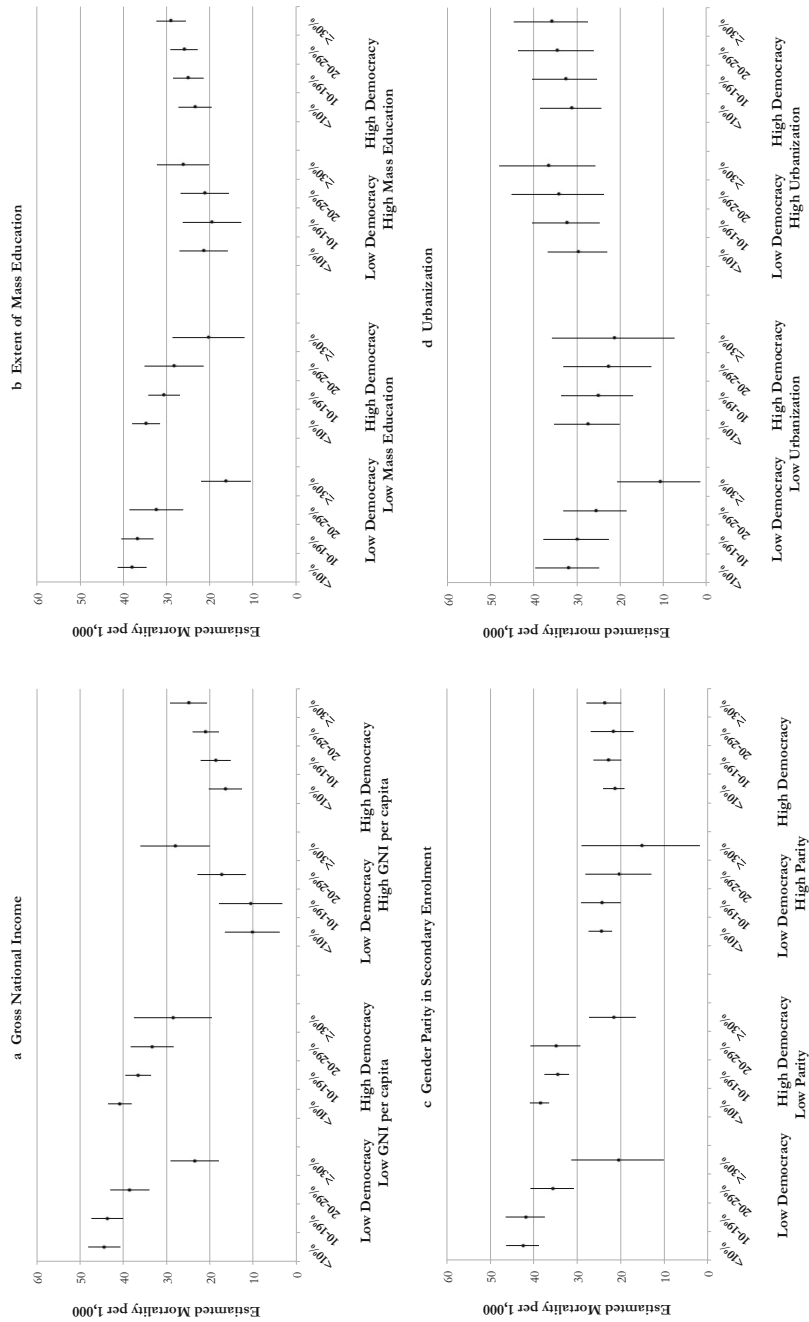
As noted earlier, the use of measures like GDP per capita as a catchall indicator of development is the subject of considerable criticism. Hence, we examine alternative specifications of our model using five different measures of social development: (1) logged gross national income; (2) human development index values; (3) extent of mass education; (4) gender parity in gross secondary enrollment; and (5) urbanization. Each of these specifications provides a lens into both the robustness of our earlier results and the degree that the women's representation–democracy–development nexus operates more generally. For the first two measures, our models substitute these alternative measures of development for log GDP per capita and are estimated as before. In the latter cases, the variables are already in our models, and we simply swap them for logged GDP per capita in the interaction terms. Because the statistical gains of including three-way interactions were supported in all cases (see the online appendix, Table S2), we again calculate and interpret estimated mortality rates to describe the complex contingencies indicated by interactions.

To summarize these findings (see Figs. 3 to 6), we note four main patterns to the estimates. First, evidence of population health gains due to increases in the percentage of legislators who are women is weakest in the case of neonatal mortality. Although gains are still evident with high women's representation at low levels of democracy and development, significantly lower mortality is seen only for gross national income, extent of mass education, and gender parity in secondary enrollment. Still, these estimates are sufficiently low that they are still statistically indistinguishable from rates at higher levels of social development. This is not the case for estimates at lower levels of women's representation in contexts of low democracy and low development.

Second, the estimated associations for 30 % or more women in parliament is robustly observed for four of the five indicators of social development for infant, child,



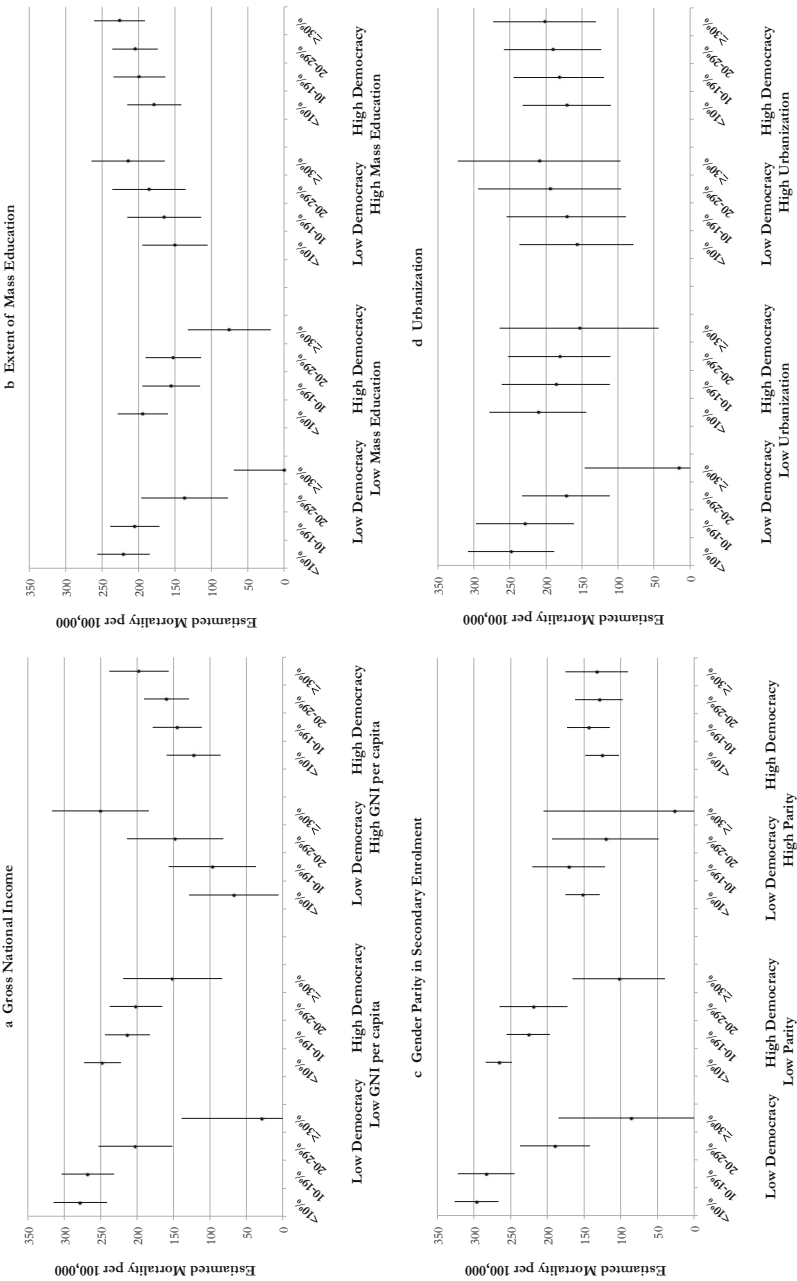
**Fig. 3** Estimated marginal effects: Predicted neonatal mortality rate by female political representation, extent of democratic institutionalization, and various indicators of economic and social development with other covariates held at their means



**Fig. 4** Estimated marginal effects: Predicted infant mortality rate by female political representation, extent of democratic institutionalization, and various indicators of economic and social development with other covariates held at their means







**Fig. 6** Estimated marginal effects: Predicted maternal mortality ratio by female political representation, extent of democratic institutionalization, and various indicators of economic and social development with other covariates held at their means

and maternal mortality at low levels of democracy and development. In each case, we find no substantive differences between lower levels of women's political representation but large and robust differences compared with when the share of seats held by women is at least 30 %. Taking gross national income as an example, the differences in estimated rates between low and high representation when democracy and development are low are -20, -39, and -250 for infant, child, and maternal mortality, respectively. These translate into more than 50 % of a standard deviation change in mortality risk and would be considered very large by conventional standards. For extent of mass education, the differences in estimated rates are -22, -40, and -250 between the lowest and highest thresholds of seats held by women. Again, these translate into more than 50 % of a standard deviation change in mortality risk. Although magnitudes differ slightly, a similar pattern is seen for gender parity in secondary enrolment and for urbanization. Finally, when the share of legislators who are women is at least 30 %, differences in mortality risk between less-developed and more-developed countries are virtually eliminated. Estimated mortality rates when representation exceeds 30 % are either statistically indistinguishable or lower than estimated risk in more-developed contexts. In summary, we find large, robust associations between high female representation and mortality rates across multiple and diverse indicators of social and economic development.

## Discussion

There is little debate that economic development is associated with improvements in population health, yet variation in the association raises questions about the role of other social dynamics. How these factors either help connect development to better population health or help offset deficits in the relationship is a fundamental and ongoing question. In this article, we have focused on the role of women's political representation. In particular, we have examined the achievement of UN recommendations for a critical mass of 30 % of parliamentary seats, how this connects with extent of democracy and level of development, and how these, in combination, might affect mortality rates for mothers and children.

We found that women's political representation was associated with significant decreases in mortality for women and children, with large associations when women hold at least 30 % of parliamentary seats in contexts of low extent of democracy and low economic and social development. These findings suggest that women's political representation could be a unique aspect of sociopolitical development having particularly important consequences for population health. Moreover, because we controlled for many factors that female representatives might also prioritize and that might promote better health (e.g., gender parity in gross secondary enrollment), the total effect of women's representation on health might be even greater.

In framing the findings, we have emphasized the idea that the efficacy of efforts by female politicians to represent the interests of women depends on extent of democracy and economic and social development. Although there are competing ideas about how exactly the joint effects might operate, our results point convincingly to women's representation offsetting political and developmental limitations. This finding is consistent with arguments that descriptive representatives will

improve the substantive representation of their group's interests in the presence of certain democratic deficits: specifically, where group mistrust is high, where interests are less crystallized, where ability to rule is questionable, and where *de facto* legitimacy is low (Mansbridge 1999). Given that other work has suggested a relationship to democracy that is opposite to what we observe (cf. Caldwell 1986; Swiss et al. 2012), our findings should not be the last word on such issues. We hope that our work fosters future theoretical and empirical study of sociopolitical context and its implications for population dynamics.

Our findings may also provide insight into how developmental gains may accrue from social policies that advance multiple, interlinked objectives. Large-scale social programming, such as that targeting the UN Sustainable Development Goals (see, e.g., United Nations Millennium Project 2005), operates on two logics. First, development is fostered through the achievement of multiple goals that target different aspects of social and economic conditions. Second, development prospects are enhanced when goals operate in tandem. One interpretation of our research is that increases in women's representation indicate increased political empowerment (United Nations Women 2017). That this increased political empowerment is tied to improvements in population health suggests synergies between policies that increase women's political status more broadly (e.g., women occupying leadership positions in parties, serving on committees, and being appointed as cabinet members) and policies that seek to reduce mortality among women and children, particularly at earlier stages of developmental continuums.

Our work is not without limitations, some of which highlight important areas for future research. First, because our analytic approach is observational, we are unable to interpret the estimated associations as causal effects. Although fixed-effects models control for all time-stable attributes of countries, they are still vulnerable to bias from time-varying influences. We attempted to mitigate this with a coherent set of time-varying controls, but all caveats about causal inference remain. Second and related, changing norms and values around gender may undermine the unique importance of women's political representation. As noted earlier, increases in the number of women in politics are associated with broad-ranging political, ideational, and economic processes (Fallon et al. 2012; Paxton and Kunovich 2003). Consequently, one could think that support for policies that increase the share of female legislators might reflect adherence to the international development agenda and its message that development is fostered through the achievement of multiple goals that target different aspects of social and economic conditions. Governments and political parties willing to adopt policies to promote gender equality (e.g., the adoption of gender quotas) might also be inclined to introduce measures that improve child and maternal health, which might ultimately be an unobserved confounder. Third, it is important to recognize that changes in the percentage of women in parliament are associated with other types of political change—notably, turnover in politicians in general, the experience base of politicians, and balances between parties with different ideological bases, to name a few. If such factors are themselves associated with policies that affect population health, parameter estimates for women's representation are likely to be biased.

By focusing only on the sex of legislators, our study is also inattentive to issues of intersectionality. Developed through an internal critique of feminist politics, activism, and scholarship, intersectionality problematizes references to “woman” as a uniform

category and raises questions about the extent to which otherwise privileged women share and understand the interests of more-disadvantaged women (Sigle-Rushton and Lindstrom 2013). The notion of intersectionality suggests that efforts to increase the share of legislators who are (privileged) women may be less effective than strategies to increase the formal political participation of multiply marginalized women. Politicians that represent those (multiply marginalized) groups with the most to gain from policy intervention may be required. Unfortunately, relative to its theoretical sophistication, intersectionality's methodology remains underdeveloped (McCall 2005; Sigle-Rushton and Lindstrom 2013), and bringing an intersectional lens to cross-national analyses such as ours is not straightforward. Gender is a primary source of social stratification throughout the world, but the most relevant intersections with gender specifically with respect to maternal and child health outcomes will be context-specific; in some places, it might be social class, but in others, caste or ethnicity may be the most pertinent modifiers. Future research should explore how to bring an intersectional lens to large-sample, cross-national comparative studies of political representation. In the meantime, complementary study designs (e.g., country-specific case studies) can be used to explore this important issue empirically; see, for example, Halim et al. (2016a) who examine the intersection of gender and caste in India.

Our research also does not identify the mechanisms by which women's representation in contexts of low political and economic development might improve population health. Prior work has found increases in immunization rates in light of increases in the number of female representatives (Bhalotra and Clots-Figueras 2014; Quamruzzaman and Lange 2016; Swiss et al. 2012). Beyond these few studies, evidence is scarce. Logical mediating factors would be increases in prenatal and postnatal nutrition of children and mothers, interventions that reduce physiological limitations (e.g., anemia or exposure to infectious diseases or environmental hazards), improved infrastructure (e.g., water and sanitation), and increased or more-targeted spending on public health. Future research that considers such issues would enrich understanding of the link between women's participation in formal politics and improvements in population health.

Efforts to improve developmental trajectories of populations recognize the necessity of ameliorating disadvantage and fostering the empowerment of marginalized people (Sen 2001). Our research highlights the potential value of such strategies by showing links between women's political representation and mortality risks. Given that globalization increasingly connects nation-states, efforts to review, evaluate, and change political systems in line with emerging international norms are commonplace. Thus, the value in encouraging efforts to increase the role of women in political leadership is clear, and such efforts could play a vital role in improving population health. More importantly, the particular significance of increases in women's representation for population health in contexts characterized by low development and weak democratic infrastructure highlights a critical role that such representation might play in enhancing developmental trajectories. If development goals are to be achieved, further increases in women's political status—although an end in itself—may have important synergistic effects that improve life chances across the globe.

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